Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

by area; hence $D=\frac{1}{2}\times6\times4\times2\sqrt{\frac{133}{13}}\div\frac{48}{13}\sqrt{10}=\sqrt{43.225}=65.7457223-$.

7. Proposed by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy in the Ohio University, Athens. Ohio.

Through each point of the straight line $x=my+h$ is drawn a chord of the parabola $y^2=4ax$, which is bisected in the point. Prove that this chord touches the parabola $(y+2am)^2=8a(x-h)$.

Solution by the Proposer.

Let the chord be $gx+fy=1\ldots.(1)$.

This cuts the curve $y^2=4ax\ldots.(2)$, in the points whose co-ordinates are given by the equations

$$x^2-\frac{2(g+2af^2)}{g^2}x+\frac{1}{y^2}=0\ldots.(3), \text{ and}$$

$$y^2+\frac{4af}{g}y-\frac{4a}{g}=0\ldots.(4).$$

The middle of the chord is then $\left(\frac{g+2af^2}{g^2},-\frac{2ag}{f}\right)$.

If this point be on the line $x=my+h\ldots.(5)$,

$$\frac{g+2af^2}{g^2}=-\frac{2amf}{g}+h\ \ldots(6),$$

$$\text{or, } g+2af^2=-2amfg+hg^2\ldots.(7).$$

Making this homogeneous by aid of (1),

$$(h-x)\frac{g^2}{f^2}-(y+2am)\frac{g}{f}-2a=0\ldots.(8),$$ a quadratic in the undetermined constant $\frac{g}{f}$, and giving the envelope $(y+2am)^2=8a(x-h)$.

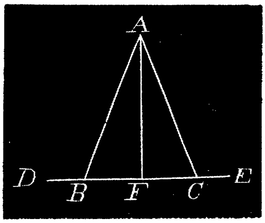
Also solved by *L. E. Pratt, Alfred Hume. G. B. M. Zerr*, and *J. F. W. Scheffer*.

8. Proposed by ADOLPH BAILOFF, Durand, Wisconsin,

If the two exterior angles at the base of a triangle are equal, the triangle is isosceles.

Solution by MISS GRACE H. GRIDLEY, Student in Kidder Institute, Kidder, Missouri; and P. S. BERG, Apple Creek, Ohio.

Let the exterior angles, ABD and ACE of the triangle ABC be equal. To prove the triangle isosceles.



PROOF: $\angle ACE+\angle ACF=2$rt. $\angle s$.

Also $\angle ABD+\angle ABF=2$rt. $\angle s$.

$\therefore\ \angle ACE+\angle ACF=\angle ABD+\angle ABF$.

(Things equal to the same thing are equal to each other).

But $\angle ACE=\angle ABD$. (HYP.)

$\therefore \angle ACF=\angle ABF$.

(If equals be subtracted from equals, the remainders are equal).

$\therefore$ Side AB=side AC, being sides opposite equal angles, and therefore $\triangle ABC$ is isosceles. Q. E. D.

Also solved by *J. A. Calderhead, J. R. Baldwin, Josiah H. Drummond, H. M. Cash, J. F W. Scheffer*, and *G. B. M. Zerr*.

PROBLEMS.

28. Proposed by Professor HENRY HEATON, M. S., Atlantic, Iowa.

Through three given points to pass two spherical surfaces tangent to a given sphere.

29. Proposed by H. W. HOLYCROSS, Superintendent of Schools, Pottersburg, Ohio.

If the two angles at the base of a triangle are bisected; and through the point of meeting of the bisectors a line is drawn parallel to the base, the length of the parallel between the sides is equal to the sum of the segments of the sides between the parallel and the base.

30. Proposed by CHARLES E. MYERS, Canton, Ohio.

A circle containing one acre is cut by another whose center is on the circumference of the given circle, and the area common to both is one-half acre. Find the radius of the cutting circle.

◆

CALCULUS.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

7. Proposed by Professor J. F. W. SCHEFFER, A. M., Hagerstown, Maryland.

To determine the function $F(x)$ so that $F(x+y)\times F(x-y)=[F(x)]^2-[F(y)]^2$.

Solution by the Proposer.

Putting $x+y=z$, $x-y=t$, we get

$F(z).\ F(t)=[F(x)]^2-[F(y)]^2$. Differentiating this equation twice according to z and t as independent variables, and considering that $\frac{dx}{dz}=\frac{1}{2},\frac{dx}{dt}=\frac{1}{2},\frac{dy}{dz}=\frac{1}{2},\frac{dy}{dt}=-\frac{1}{2}$; we obtain $F''(z)F(t)F''(t).F(z)$.

$\therefore \frac{F''(z)}{F\ (z)}=$ constant $=a^2$. Denoting $F(z)$ or $F(x)$ by u, we have the differential equation $\frac{d^2u}{dx^2}=a^2u$. $\therefore$ $u=Ce^{ax}+C'e^{-ax}$. Since $F(0)=0$, we have $C'=-C$, $\therefore$ $u=C(e^{ax}-e^{-ax})=C\sin bx$, where C and b designate any two constant quantities.